

REMARKS

Claims 1-4 were previously withdrawn. Claim 5 is amended to more particularly point out and distinctly claim the subject matter of the present invention without adding any new matter. Claims 5-13 remain in the Application. Reconsideration of the pending claims is respectfully requested in view of the above amendments and the following remarks.

I. Claims Rejected Under 35 U.S.C. § 103(a)

A. Claims 5, 12, and 13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Rhodes (U.S. Pre-Grant Publication No. 2001/0012225) in view of El Gamal et al. (U.S. Patent No. 6,642,543), Huang et al. (U.S. Patent No. 6,146,795), and Yang et al. (U.S. Patent No. 6,184,055).

To establish a *prima facie* case of obviousness, the relied upon references must teach or suggest every limitation of the claim such that the invention as a whole would have been obvious at the time the invention was made to one skilled in the art. Among other elements, amended Claim 5 recites:

- “g) forming a plurality of photodiodes and a plurality of the drive transistors, the select transistors, the transfer transistors and the reset transistors in the pixel array based on the first and the second gate insulator layers wherein each transistor of the pixel array has a stacked insulator layer having the first and the second gate insulator layers stacked thereon; and
- g) forming at least one transistor in the logic circuit based on the second gate insulator layer.” (Emphasis added)

Applicants submit that the cited references, separately or in combination, do not teach or suggest “each transistor of the pixel array has a stacked insulator layer having the first and the second gate insulator layers stacked thereon.”

Rhodes discloses an image sensor having a readout circuit 60 and a pixel 14 containing a drive transistor 36, a select transistor 38, a transfer transistor 28, and a reset transistor 32. El Gamal discloses a CMOS image sensor 500 including pixel transistors

510 and 520 in a thick gate region, and select transistor 540 and logic transistor 550 in a thin gate region. Huang is relied on for disclosing a method for producing thicker and thinner gate insulators. Yang is relied on for disclosing forming identical pixel transistors. However, none of the cited references, separately or in combination, disclose the claimed **stacked insulator layer** having the first and the second gate insulator layers stacked thereon. Rather, the thick gate insulator disclosed by the cited references is a **single layer of thick oxide** which does not include two stacked layers (see, e.g., col. 2, lines 58-60 of El Gamal and FIG. 1 of Huang). Rhodes and Yang do not even mention a thick gate isolator. Thus, the cited references fail to teach or suggest the stacked insulator layer having the first and the second gate insulator layers stacked thereon.

Thus, none of the cited references, separately or combined, teach or suggest all of the elements of amended Claim 5.

Claims 12 and 13 depend from Claim 5 and incorporate the limitations thereof. Thus, for at least the reasons mention above, the cited references do not teach or suggest each of the elements of these dependent claims. Accordingly, reconsideration and withdrawal of the obviousness rejection of Claims 5, 12, and 13 are request.

B. Claims 7-9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Rhodes in view of El Gamal, Huang, and Yang as applied to Claim 5 above, and further in view of Ahn (U.S. Patent No. 5,804,491).

Claims 7-9 depend from Claim 5 and incorporate the limitations thereof. Thus, for at least the reasons mention above, the cited references do not teach or suggest each of the elements of these dependent claims.

The Examiner cites Ahn for disclosing a method of removing a gate insulator by wet etching with HF or BOE. However, Ahn does not cure the deficiency of the other cited references, which fail to teach the claimed stacked insulator layer. Thus, none of the cited references teach or suggest each of the elements of Claims 7-9. Accordingly,

reconsideration and withdrawal of the obviousness rejection of Claims 7-9 are requested.

C. Claims 10 and 11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Rhodes in view of El Gamal, Huang, and Yang as applied to Claim 5 above, and further in view of Hori et al. (U.S. Patent No. 5,707,487). Applicants respectfully traverse the rejection.

Claims 10 and 11 depend from Claim 5 and incorporate the limitations thereof. Thus, for at least the reasons mention above, the cited references do not teach or suggest each of the elements of these dependent claims.

The Examiner cites Hori for disclosing a method of removing a mask using sulfuric acid or an O₂ plasma etch. However, Hori does not cure the deficiency of the other cited references, which fail to teach the claimed stacked insulator layer. Thus, none of the cited references teach or suggest each of the elements of Claims 10 and 11. Accordingly, reconsideration and withdrawal of the obviousness rejection of Claims 10 and 11 are requested.

II. Allowable Subject Matter

Applicants note with appreciation the Examiner's indication that Claim 6 would be allowable if rewritten in independent form. Applicants respectfully submit that the amendment to Claim 5 has obviated the need to rewrite Claim 6. Thus, Claim 6 is allowable for at least the reasons mentioned in regard to Claim 5. Accordingly, reconsideration and withdrawal of the objection of Claim 6 are requested.

CONCLUSION

In view of the foregoing, it is believed that all claims now pending patentability define the subject invention over the prior art of record and are in condition for allowance and such action is earnestly solicited at the earliest possible date.

Respectfully submitted,

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